

EXPLORING THE LIVED EXPERIENCES OF DAVAO DEL SUR RICE FARMERS IN USING AGRICULTURE APPLICATIONS THROUGH SMARTPHONES

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ABSTRACT

This qualitative study was organized to explore the direct experiences of Davao del Sur rice farmers engaging with agriculture applications through smartphones. Through extensive interviews as the primary methodology and thematic analysis, the research delved into the various dimensions of these farmers' interactions, challenges, and advantages experienced and encountered with technology in agricultural practices.

Findings revealed the significant challenges, benefits, and social dynamics influencing the adoption and utilization of mobile applications. Moreover, the study explicated the socio-economic implications and the transformative potential of technology in agricultural

landscapes in the region. Insights reaped from this research contributed to a deeper understanding of the lived experiences of rice farmers, emphasizing the complex relationship between technology integration and agricultural productivity within the context of Davao del Sur.

Keywords: agriculture applications, smartphones, technology integration

Chapter 1

INTRODUCTION

In today's era, the impact of technological advancements extends across diverse sectors, catalyzing transformative changes in practices and approaches. One such sector that is profoundly influenced is agriculture.

Recognizing the pivotal role of technology in agriculture, particularly in rice farming, the Philippine government places digital transformation at the forefront of its priorities, as exemplified by the Masagana Rice Industry Development Program (MRIDP), initiated during the Marcos administration (DA, 2023).

Davao del Sur, distinguished as the premier rice-producing province in Mindanao due to the remarkable yield performance of its municipalities (Hondrade, R. 2007), stands as a significant player in the country's agricultural landscape. In response to the evolving needs of farmers and the dynamic agricultural environment, the province has become a focal point for digital agriculture interventions, notably through the implementation of the Digital Farmers Program (DFP) by the Department of Agriculture-Agricultural Training Institute (DA-ATI).

DFP is an Information and Communication Technology (ICT) capacity-building initiative of DA-ATI and Smart Communications, Inc. Its objective is to aid Filipino farmers in improving digital information access and literacy and facilitating access to market opportunities. The program encompasses capacity enhancement across a diverse range of services, including smartphone and social media usage, online payment mechanisms, and e-commerce.

Another significant aspect of DFP involves educating farmers on the use of agriculture applications through their smartphones (ATI, 2023).

The combination of government efforts and digital interventions has led to a noticeable change in how some farmers in Davao del Sur do their work using mobile apps in their daily routines.

To understand the depth of this change and its impact on sustainability and productivity, this research aims to explore farmers' experiences in using agri-apps in Davao del Sur. By studying the experiences of farmers in the program, this research hopes to provide insights for future policies, improve program implementation, and contribute to the ongoing discussion about the intersection of technology and agriculture in the Philippines.

Statement of the Problem

The primary purpose of this study is to explore the lived experiences of farmers in Davao del Sur who use digital technologies in farming, particularly agriculture applications or agri apps, through their smartphones. Specifically, the study attempted to answer the following questions:

1. What is the socio-demographic profile of the participants?
2. What agri-apps are they using in agricultural practices and productivity?
3. What is the lived experience of the farmers using agri-apps in farming?

Objectives of the Study

The primary objective of this study is to navigate the lived experiences of farmers using digital technology through smartphones, particularly agricultural applications or agri apps, in their farming activities. This study aims to pinpoint farmers' specific agri apps and understand how these tools have been integrated into their daily farming routines. With this, we will be able to assess the impacts of these agri apps on farmers' agricultural practices and productivity, examining any shifts in efficiency, crop yield, cost-effectiveness, and other relevant metrics since the inception of these digital tools.

Another important aspect of this study is knowing the influence of agri-app usage on farmers' socio-economic well-being, including changes in income levels, financial stability, social status, and overall quality of life. Additionally, the study will investigate the factors that encourage or hinder farmers from adopting agri apps and any obstacles they encounter when employing these digital technologies, thereby identifying potential barriers to adoption and areas for improvement in the app design. Finally, the research will explore strategies that could inspire other farmers to adopt these digital technologies, understanding the elements that could affect their decision to use agri apps, and how farmers currently using these tools can facilitate their promotion within the farming community.

Significance of the Study

This study will contribute to a deeper understanding of the substantial impact of using agri-apps in farming. Through the farmer's narrative on the use of these applications.

The findings may guide the Department of Agriculture (DA) and its subsidiary offices at the grassroots level in recognizing the impact of using agricultural applications in rice farming. This can lead to developing effective strategies to enhance the adoption and effectiveness of digital tools, ultimately benefiting farmers and promoting sustainable farming practices.

This study will help ARD policymakers and development practitioners more effectively harness mobile applications to generate economic and social opportunities with lasting impacts.

Scope and Limitations:

This qualitative study was conducted primarily to explore the lived experiences of rice farmers engaged with digital technology in agriculture, particularly agri apps, focusing on understanding the factors that shape their adoption and utilization of these tools. The data collection was participated by 14 participants whose ages ranged from 37 years old to 57 years old. These participants have years of experience from 3 years to 39 years. The study

was done through the utilization of one-on-one, semi-structured interviews with farmers in Davao del Sur as a survey and reference.

Definition of Terms:

Agri-apps. Agri-apps are software applications specifically designed for use in agriculture and farming. These apps cater to various aspects of agriculture, providing tools for tasks such as crop management, weather forecasting, soil analysis, livestock monitoring, market information, agricultural education, and more. They aim to enhance efficiency, productivity, decision-making, and overall management within the agricultural sector.

Agriculture. Agriculture is the art of cultivating the soil, growing crops, and raising livestock.

Farmers. Farmers are individuals or groups involved in agriculture, responsible for cultivating land, raising crops, and/or rearing animals for food, fiber, or other agricultural products.

Technology Integration. Technology integration refers to the use of technology resources and tools in various aspects of daily life. It involves blending technology into existing practices or systems to achieve specific goals or objectives.

Smartphones. Smartphones are advanced mobile devices that combine the functionalities of a mobile phone with computing power similar to that of a computer.

Chapter 2**REVIEW OF THE RELATED LITERATURE**

This chapter consists of a review of related literature and the theoretical framework itself, including its presentation in the form of paradigms, and discussion on key variables.

Mobile applications for agricultural and rural development

Mobile applications (m-apps) in general and mobile applications for agricultural and rural development (m-ARD apps) in particular hold significant potential for advancing development since they could provide access to information, markets, finance, and governance systems previously unavailable for millions of people but are so affordable today (Qiang, C. Z et al. 2012)

The increasing prevalence of mobile agriculture (M-Agri) services has brought significant benefits to smallholder farmers, offering access to financial facilities, agricultural information, and supply and marketing services. This positive impact is attributed to the widespread availability of mobile phones and Internet facilities.

However, the distribution of these benefits is uneven, with studies emphasizing the potential for technological changes to enhance livelihoods in the global south, particularly in Africa. Despite these potential advantages, some African studies question the sustainability and overall impact of the digital revolution in agriculture.

Information and communication technologies (ICTs), including hardware like computers, mobile phones, and software like Internet facilities, play a pivotal role in digital transformation. The focus on using ICTs for agricultural development in Africa, commonly known as ICT4D, has steadily evolved.

Adopting digital technologies is a driving force in regions where farmers have increased access to agricultural information. Agriculture being location-specific, tailored advice on practices, input use, weather predictions, and market information is crucial. The growth of the Internet and associated digital technologies, particularly mobile phones, enables farmers to access real-time data, overcoming limitations faced by traditional agricultural extension services.

Harnessing Internet use and digital technologies facilitates information retrieval for farmers and addresses constraints traditional agricultural advisory services face. This, in turn, paves the way for transformative

agricultural development, fostering collaborative knowledge exchange and learning in the agricultural sector (Kamal et al., T. A. (2023).

Digital Agriculture Program

Productivity growth in small-farm agriculture is crucial for economic development and poverty reduction in developing countries. However, smallholder farmers face unpredictable weather, market risks, and limited access to information, technologies, and financial services, leading to low productivity and market participation rates. Overcoming these constraints is a crucial policy question for rural development.

Agricultural extension services have traditionally been the primary method of public-sector support in disseminating knowledge and innovation to small farms. These services often involve educating farmers directly or working with "model farmers" to multiply information. However, due to insufficient funding, traditional approaches have been limited, resulting in low outreach and information that may not meet farmers' needs.

New digital extension approaches leveraging information and communication technologies (ICTs) such as mobile phones and internet platforms, have been proposed to address these challenges. Despite the potential benefits, there is limited empirical evidence of their impacts. Using data from smallholder farmers in India, this article explores whether digital extension with personalized advice can enhance innovation, productivity, and income in the agricultural sector (Rajkhowa et al.; M., 2021).

Philippines' Rice Production

In recent decades, technological innovations have played a significant role in transforming rice production in the Philippines. The establishment of two critical rice research and development (R&D) institutions, the Philippine Rice Research Institute (PhilRice) and the International Rice Research Institute (IRRI) has been instrumental in driving the extensive development of modern rice technologies in the country. Adopting these technologies has created opportunities for farmers to enhance rice production, increase incomes, and improve food security for rice farming households.

Despite the positive impact of these technologies, the adoption of different technology packages by farmers has only achieved partial success in implementing research and development outputs. True innovation from R&D emerges when farmers effectively utilize the technology. However, challenges to widespread technology adoption persist in the agricultural sector due to various socioeconomic, institutional, and environmental factors. It is uncommon for all farmers to adopt new technologies willingly and effectively.

The analysis of technology adoption is a vast research topic in economic literature, particularly in the agricultural sector. Like many Asian countries, the emergence of the Green Revolution prompted extensive research on the adoption of farm technologies in the Philippines. Early empirical studies by Ruttan (1977) and Dalrymple (1978) focused on the adoption of modern varieties (MVs). A broader examination of adoption rates of inbred rice MVs at the global, regional, and national levels was conducted by Herdt and Capule (1983). This historical context underscores the ongoing efforts to understand and promote the successful adoption of agricultural innovations in the Philippines (Mariano et al., 2012).

Roles and influence of key players

Rice is paramount in the Philippines, serving as the staple food for most Filipinos and as a crucial source of income for a vast network of stakeholders on both the demand and supply sides. The rice industry encompasses over three million farmers and their families, along with numerous traders, millers, retailers, and individuals engaged in producing, processing, and marketing related products (Intal & Garcia, 2005).

In the contemporary landscape of Philippine rice production, each key player plays a vital role:

1. Farmers and Their Families:

Act as the primary cultivators and stewards of rice crops.

Directly contribute to the country's food security and economic development through agricultural activities.

2. Traders:

Facilitate the movement of rice from producers to consumers, ensuring a steady supply chain.

3. Millers:

Play a crucial role in processing raw rice, and turning it into market-ready products.

4. Retailers:

Connect the rice products to end consumers, contributing to the accessibility of rice in the market.

5. Individuals in Production, Processing, and Marketing:

Contribute to various stages of the rice production chain, including cultivation, processing, and marketing, ensuring the flow of rice from fields to tables.

Recognizing the significant contribution of the rice industry to the country's economic development, the government has implemented programs aimed at increasing productivity and enhancing the competitiveness of the rice sector. This holistic approach considers the roles of each stakeholder, emphasizing the collaborative efforts needed to sustain and improve the vital rice production system in the Philippines (Mercado et al. et al., 2023)

Theoretical Framework

The theoretical foundation of this research on the lived experiences of Davao Del Sur farmers using agriculture applications through smartphones is anchored in two vital technological perspectives and theories. These theories provide a framework for understanding the phenomenon's multifaceted aspects.

Social Construction of Technology (SCOT)

By employing the SCOT framework, influenced by the work of Bijker, Pinch, and Callon, the study can provide a nuanced understanding of how digital technology is socially constructed in the context of agriculture. This theoretical lens emphasizes the agency of farmers, the interpretative flexibility of technology, and the dynamic social processes that shape the adoption and use of digital tools.

The Technology Acceptance Model

The Technology Acceptance Model (Davis, 1989), or TAM, posits that two factors determine whether a computer system will be accepted by its potential users: (1) perceived usefulness and (2) perceived ease of use. The key feature of this model is its emphasis on the perceptions of the potential user.

Chapter 3**METHODOLOGY**

This chapter includes descriptions of the method used, sources of data, data gathering instruments, sampling technique, study procedure, and statistical treatment.

Research Design

This study employed Interpretative Phenomenological Analysis (IPA), an approach in qualitative research wherein the researchers aim to “explore in detail how participants are making sense of their personal and social world” (Smith et al., 2009). IPA is interpretative because the researchers illustrated how the participants interpret their life experiences. This is also phenomenological as it involves the participant’s life world, personal experiences, and personal perception of an object or event. Moreover, IPA has a two-stage interpretation process or double hermeneutic, wherein “participants are trying to make sense of their world” and “the researcher is trying to make sense of the participants’ sense-making of their experiences” (Smith et al., 2009).

Method Used

This qualitative research study explored the lived experiences of Davao del Sur rice farmers in using agriculture applications through smartphones. Researchers collected data through semi-structured interviews, providing definite responses and open-ended questions, with rice farmers from different agricultural backgrounds, socio-demographic profiles, and digital orientations to capture the diversity of their experiences. Moreover, researchers employed document analysis to triangulate the data gathered from participants' narratives. Moreover, the researchers used manual coding to identify patterns, ideas, and meaning from the data set.

The codes identified were then used to create themes and subthemes to categorize the common experiences of the participants in integrating agri apps through smartphones into their farming practices. It was thoroughly assessed for the lived experiences of Davao del Sur farmers using agriculture applications through mobile phones to be conceptualized and further interpreted. Furthermore, the findings of this qualitative study are presented in narrative form, supported by participants' verbatim, quotations, and examples, to illustrate the themes and nuances of their lived experiences as rice farmers in Davao del Sur.

Data Source

This study on the lived experiences of Davao del Sur rice farmers in using agriculture applications through smartphones will primarily gather data from firsthand accounts and in-depth narratives of the rice farmers themselves. Participants' experiences with agri-apps and motivations to adopt digital farming are supplemented by the semi-structured interviews. Additionally, the different levels of adaptability of the participants will provide a comprehensive exploration and contribution to the efficiency of the study. Researchers will strictly follow the ethical guidelines for securing the anonymity and confidentiality of the participants.

Data Gathering Instruments

In this qualitative research study on the lived experiences of Davao del Sur rice farmers in using agriculture applications through smartphones, multiple data gathering instruments were employed to collect rich data implications. A semi-structured interview is the primary instrument used by asking the participants through open-ended questions and probing follow-ups to elicit detailed narratives. As a rule, qualitative researchers must utilize the open-ended question formula. Creswell (2003) advised researchers to "Use open-ended questions without reference to the literature or theory unless otherwise indicated by a qualitative strategy of inquiry" (p. 107). The open-ended questions are carefully constructed to explore various implications of the participants' experiences in integrating agri apps through smartphones into their daily farming practices. Agricultural apps installed and used by the participants were checked by the researchers to confirm application usage. The participants were also asked to demonstrate how they use their smartphones in rice farming which provided supplementary contextual data. The triangulation of these instruments enhanced the comprehensiveness and validity of the data gathered. Ethical considerations were thoroughly upheld and observed throughout the data-gathering process.

Chapter 4 Results and Discussion

Socio-Demographic Profile of the Participants in the Study

This study was participated in by **14 farmers in Davao del Sur**. As shown in Table 1, the researchers were able to interview **9 males** and **5 females**. All of the participants are adult rice farmers whose ages range from **37 years old** to **57 years old**, with years of farming experience ranging from **3 years** to **39 years**. All of the participants are agri-app users.

Shown in Table 1 is a detailed socio-demographic profile of the participants in the study.

Gender	Age	Years in Farming	Agri-app users

Male	Female	30-40	41-50	50-51	3-10	11-20	21-30	31-40	1-14
9	5	1	6	7	3	4	4	3	14

Agri-apps used in agricultural practices and productivity

Based on the data gathered during the interview, the majority of the participants revealed that they are using Binhing Palay app, e-Damuhan app, Leaf Color Computing (LCC) app, Accuweather app, SpidTech app, Minus-One Element Technique (MOET) app, and Rice Doctor app, in their agricultural practices and productivity.

Shown in Table 2 are the statements of the participants concerning the agri-apps they installed and used

Participants	Statement
1	Binhing palay, e-Damuhan, LCC, Accuweather, Spidtech
2	Binhing palay, Rice Doctor, Accuweather, LCC, MOET
3	LCC, e-Damuhan, SPIDTECH, Binhing Palay
4	Binhing Palay, Accuweather
5	e-Damuhan, Accuweather
6	Binhing Palay, LCC
7	Binhing Palay
8	e-Damuhan, Binhing Palay
9	e-Damuhan, Binhing Palay
10	Accuweather
11	Accuweather, Binhing Palay, LCC
12	Accuweather, Binhing Palay, e-Damuhan, LCC
13	Binhing-Palay, Accuweather, SPIDTECH & E-Damuhan.
14	Accuweather, Binhing-Palay, E-Damuhan, SPIDTECH, LCC

Participant 2 described the function of the Binhing Palay App as a guide in choosing the rice variety to plant before the start of the planting season.

Tan-awon namo sa Binhing Palay kung unsang variety among itanom kung ideal diria sa area namo.- Participant 2

Ginagamit namo ang binhing palay app pag start sa cropping season- Participant 2

Binhing Palay, as set out by the Philippine Rice Research Institute (PhilRice), seeks to assist farmers in selecting the appropriate rice variety for cultivation, as it contains information on over 200 varieties of rice, including their agronomic characteristics, pest and disease resistance, and grain quality, sourced from both private and public rice breeders. (PhilRice, 2021)

On the other hand, Participant 12 described the function of the e-Damuhan as a tool for identifying weeds and providing management recommendations for their elimination.

Sa E-Damuhan makita unsa klaseng sagbot unsay angayan nga ispray, mamatay ba ni sa mga chemical.- Participant 12

According to PhilRice, e-Damuhan is a mobile tool that identifies weed images and provides descriptions and recommendations on weed control by exploring a comprehensive list of Philippine weed species, including their scientific and local names, their impact on rice, and recommended management practices. (PhilRice, 2021)

Moreover, Participant 11 described the function of Leaf Color Computing (LCC) as a tool for identifying nutrient deficiency in rice by capturing images of a rice leaf.

Picturan ang dahon sa humay isend nimo tapos moreply man to nga mao ni ang kulang nga nutrients.- Participant 11

This statement was supported by PhilRice, as they described LCC as a mobile app that swiftly generates nitrogen recommendations in less than a minute, utilizing digital images of intact rice leaves captured directly from the field. (PhilRice, 2021)

Furthermore, participant 1 described the function of Accuweather as an app that aids in their decision-making on when to apply fertilizer as it provides accurate weather forecasting.

Panahon sa tig apply og fertilizer, pananglitan muabuno mi og hapon, tan-awon namo daan ng udto kung naa bay posibilidad nga muolan, pila ka percentage ang gikusgon sa ulan.- Participant 1

According to AccuWeather Inc., the AccuWeather app collects real-time data through the Digital Forecast System to produce accurate weather forecasts. (AccuWeather Inc., 2023)

Lastly, Participants 1 and 13 described the function of the Smart Pest Identification Technology (SPIDTECH) as a tool enabling them to identify pests and diseases in rice through its pest and disease library feature and by capturing images of pests and diseases.

Diba naa man syay pest disease library, tan-awon nako sya ma'am nga unsa nga klaseng mananap mutan-aw ko sa spidtech kay makuha naman didto unsang klaseng mananap like steamborer, rice bug, ginagamit nako sya two times a week human sa tanum. - Participant 1

Halimbawa sa test nga blackbug, picturan na nimo, tapos isend moreply mohatag siya og recommendation nga unsa nga medisina ang dapat iapply.- Participant 13

Guiam A *et al.* described SPIDTECH as an app developed for the digital identification and remote monitoring of insect pests and diseases of rice, corn, coffee, cacao, banana, coconut, sugarcane, tomato, and soybean in the Philippines (Guiam A *et al.*, 2021).

The lived experience of the farmers using agri-apps in farming

This section presents the theme and sub-themes that emerged from the data collection and thematic analysis process of the lived experiences of rice farmers in Davao del Sur using agri-apps through smartphones. The researchers used manual coding to identify patterns, ideas, and meaning from the data set. The codes identified were then used to create themes to categorize the common experiences of the participants in integrating agri apps through smartphones into their farming practices.

With the data gathered from the interview, the transcripts were used for the extraction of major themes. Four (4) themes were drawn out of the interview conducted with rice farmers: motivation to adopt agri-app technology, the impact of agri-apps on rice farmers, challenges in using agri-apps, and sustained adoption of agri-apps.

Theme 1: Motivation to adopt agri-app technology

Based on the data gathered, one of the emerging themes found in the study concerning the lived experiences of rice farmers in Davao del Sur in using agri-apps through smartphones is the motivation to adopt agri-app technology.

The majority of the participants pointed out that they were motivated to use digital agriculture applications such as agri-apps after having undergone formal training on Digital Farmers Program 103 for Rice (DFP 103 for Rice) by the Department of Agriculture Agricultural Training Institute- Regional Training Center XI (ATI-RTC XI) this year (2022).

Sukad atong nakaseminar ko sa ATI mao pay paggamit nako sa agri apps. -Participant 8

Sukad atong naka attend ko og training sa DFP didto ko nadani nga mugamit ani nga mga apps- Participant 9

ATI kay sila man nagdala ana, sila nagtudlo sa amoa sa smartphone- Participant 13

Only Participant 7 said he had prior knowledge about using agri-apps before attending the DFP training. However, it was just one app, the Binhing Palay app.

Naa koy idea about agri-apps before DFP, pero isa lang akong nahibal-an, Binhing Palay app lang- Participant 7

Theme 2: Impact of Agri-apps on Rice Farmers

Another theme generated in the lived experiences of rice farmers using agri apps through smartphones is the impact of agri apps on rice farmers. Based on the data gathered during the interview, this theme revealed the following sub-themes: efficiency and an increase in income.

Efficiency. All of the participants disclosed that before using agri apps, they used traditional farming methods, which are more labor-intensive, time-consuming, and unscientific.

Respondents recalled that in the past, they used to rely on observing the sky (mata-mata)

to forecast the weather, specifically to determine if it would rain on the day of direct seeding, fertilizer application, or harvesting. Other respondents shared that they used to watch for signs by looking at the moon and star's alignment or a cat's eye to predict the weather—common unfounded traditional beliefs in the Philippines.

Ang among tanawon ang weather pag magdagum naa gyud nay ulan, paghapsay ang panganod wala gyud nay ulan. pag naay bitoon wala gyud nay ulan. Sa mata sa iring magtanom ka og kamote, saging, gulay mao na ginatanaw sa mga tigulang. Pagmata sa iring lingin takdol daw na siya. Pag dili lingin mata sa iring kung sa dagat pa hunas.- Participant 14

Manan-aw sa mata sa iring kung muulan o dili. Kung dako iyang mata naay timailhan nga muulan. Sauna mahulog og tagna-tagna. Kanang bitoon sad motan-aw mi.- Respondent 11

Bitoon akong ginatanaw. Naa man gud sign sa mga karaan, naay bitoon nga bangka kung magkulob na siya mag-ulan na siya. Makita gyud na nimo, mura gyud na og bangka. Nagatanaw lang sad mi sa mata sa iring. Dili namo maperfect kay dili nagakuha sa satellite ang mga karaan.- Participant 12

Now, with the presence of an agri app like Accuweather, they can check the rain status before pursuing the necessary rice farming processes.

Before mag land prep og sabod, wala gyud mi parehas karun na imung tan-awon sa cellphone nga mga apps kung muolan ba, pananglitan magsabod mi karung adlaw, wala mi kabalo kung muolan ba na inig kahapon. Murag mao nay kalainan sa una og karun. Pwede man ka mutan-aw sa accuweather kung naa bay ulan karun adlaw, maatras namo depende sa panahon nga makita namo sa app.- Participant 3

Accuweather permi nako ginatan-aw kay magamit kung mangabuno kay kung di kankabalo nga mag-ulan man diay karon adlaw or gabii, masayang lang ang abuno- Participant 10

Kanang magpa-ani mi ma'am, tan-awon namo ug muulan ba anang adlaw or dili kay kung naay ulan dili nalang namo ipadayon ug harvest.- Participant 5

Moreover, Participant 3 also mentioned the convenience and ease of choosing the desired rice variety with the help of agri-apps like Binhing Palay. Unlike in the past, farmers had no scientific basis or options to determine the suitable rice variety and could only rely on manual observation.

Sauna akong papa ang binhi na among ginatanom kambyo-kambyo lang sa silingan. Kung tan-aw niya na tupong og nindot ang ani sa silingan pag ani ana, makigkambyo dayon sya og usa ka sako para mao to iyang itanum, dili mamalit. Dili parehas karun na pwede naka mamili, pwede naka musearch sa binhing palay kung unsa nga similya imung itanum. Kung hybrid naa didto ang hybrid, kung inbred naa pud. -Participant 3

Two participants disclosed that agri apps help them find answers to simple problems encountered in rice farming without the intervention of an Agriculture Extension Worker (AEW) or Agriculture Technician.

Mapadali ang trabaho og nigaan kay pwede nami mag-self-research dili na kinahanglan nga muadto sa technician gawas lang sa dinagko nga sakit.- Participant 2

Dako kaayo og ikatabang ni nga mga application kay dili naka maglisod og asa ka mangutana o maghangadhangad.- Participant 1

Participant 2 confirmed that using agri-apps proves to be efficient for rice farmers as it eliminates the time to seek assistance for farming guidance. He further described that before, they used to wander, uncertain of what actions to take, but now they simply access the correct farming practices on their smartphones.

Yes. Sa akong observation ang farmers nga nag subay na sa agri-apps napadali na ilang mga trabaho. Dili na kay bisig asa pa sila manguta kung unsay himuon sa pag-saka. Sauna, mag loading pami unsay himuon, karun magbasa nalang mi sa cp.- Participant 2

Increase in income. Some participants revealed that using agri-apps in rice farming has led to a significant increase in income. The results and recommendations derived from these apps have helped reduce farm costs and increase income by providing farmers with precise advice on the best high-yielding rice variety to plant, the appropriate type and amount of fertilizer to apply, the correct pest and weed management strategies to implement, and accurate weather forecasting.

Ang agri apps nakatabang nga mudako among abot tungod sa mga ginahatag nga recommendation sa abono, unsa ang angay iapply arun mawagtang ang peste og sagbot- Participant 2

Dako kaayo syag tabang maam labi na sapag save sa abuno kay sakto ang pag abuno, gwapo pud ang abot.- Participant 10

Dili parehas sauna nga wala mi kabalo sa mga sakit, karun dali lang mamonitor gamit ang mga apps. -Participant 3

Dako siyag tabang ma'am kay parehas anang Binhing-palay ug dako ba mig abot. -Participant 6

Kay sauna nga wala pa mi naggamit, mas gamay among abot. Karon kabalo nami sa mga pamaagi.-Participant 8

Theme 3: Challenges in using agri-apps

Another theme generated in the lived experiences of the rice farmers using agri apps through mobile phones is the challenges of using agri apps. Based on the data gathered during the interview, this theme revealed the following sub-themes: digital novice and slow internet/data connection.

Digital novice. Two participants disclosed that they are having a hard time navigating the agri app because they are first-time smartphone users.

Siyempre kay bag-o pang tuon sa cellphone maglisod gyud mig gamit, kay kung wala pa pud mi naka seminar dili pud mi makatuon- Participant 1

Naglisod kay dili pa kaayo hanas sa paggamit og cellphone kay bag-o ra ko nakakat-on-Participant 3

Slow internet/data connection. The majority of the participants cited slow internet/data connection as the primary challenge in using the agri-apps because some features of the agri-apps need the internet to work.

Dili kaayo kusog ang data connection sa among lugar so kung wala mi wifi maglisud mig connect sa internet- Participant 1

Magloko ang internet connection.- Participant 11

Hinay ang data sa globe, sa Smart lang naa. Nisamot kahinay ang data atong naa nay mga wifi vendo.- Participant 2

Some disclosed that apart from slow internet or data connection, they experienced no problem using the agri apps.

Wala mi problema basta naay signal- Participant 4

Walay problema, sayon ra gamiton ang app- Participant 9

Wala may problema so far kung naa lang internet- Participant 10

Theme 4. Sustained adoption of agri-apps

Another theme generated in the lived experiences of rice farmers using agri apps through mobile phones is the sustained adoption of agri apps. Based on the data gathered during the interview, this theme revealed the following sub-themes: continual usage of agri apps, support, and knowledge sharing.

Continual usage of agri-apps. Some of the participants disclosed that they would use agri-apps in rice farming permanently. One respondent spoke about using agri-apps while he is still farming;

Syempre maam kay mao na man ni atong kasinatian ako gyud padayonon. Mintras na mag-uma mao na gyud atong padayunon. Lisud na pud balikon tong kinaraan. - Participant 3

Participant 1 shared that he will use agri-apps until he is alive;

Yes. Mugamit na gyud ko ani hantod nga buhi pa ko. -Participant 1

Meanwhile, two participants mentioned that they will continue to use agri apps as long as they have smartphones:

Magdugay basta naa lang cellphone- Participant 4

Hantod nga naa pakoy ikagasto og naa pakay gadgets mugamit pako.- Participant 2

Support. Some participants expressed their desire for the government to continue involving them in further education on digital agriculture technology, particularly focusing on advanced agri-apps that they can download and integrate into their practices.

Mapahibalo pa sa amoa unsang mga agri-apps ang pwede nga edownload nga makatabang sa amo nga farmers. - Participant 1

Continue ang mga project sa pagtudlo sa mga farmers bahin sa digital technology. Participant 14

Continue lang more advanced nga technology ihatag sa mga farmers.- Participant 4

More training on agri apps.- Participant 1

Participant 5 emphasized the potential benefits of widespread agri-app usage among all farmers. Additionally, he expressed a hope that farmers would actively participate in seminars to provide them valuable insights into utilizing agri-apps.

Dako jud kaayo ug katabang ma'am kung tanang farmers makabalo jud ani nga mga apps. Unta kung naay seminar pa, mutambong gyud sila aron makabalo sila unsa ang mga pamaagi para ani nga mga apps.- Participant 5

Knowledge Sharing. Most of the farmers disclosed that they had shared their knowledge about agri-apps with some of their family members, co-members of their association, and other rice farmers, to also motivate them to adopt agri-apps in farming.

Nashare nako sa akong asawa, nag motivate ko sa group chat arun katong mga members na wala ka attend og training nga mudownload og agri apps, personal info drive- Participant 2

Gi share nako sa akong mga bayaw akong nahibal-an ang akong nahibal-an- Participant 3

Participants 12 and 13 disclosed that other farmers are willing and interested to learn agri-apps. Participant 12 explained that from his experience, farmers can quickly grasp the use of agri-apps if they have a genuine interest in learning it.

Naa koy natabangan isa ka tao unsaon pag install sa binhing palay app. Gitudluan nako sa pagsearch sa variety pag enter moggawas na ang classification niya. Dali ra siya makasabot kay kursunada man makabalo.- Participant 12

Gusto pud sila makakat-on. Giunsa pag install, giunsa pag tudlo, isearch nimo nga app, iinstall nimo ni, didto nimo makita ang tanan.- Participant 13

Chapter 5

Summary, Conclusion, and Recommendation

Summary:

The study engaged 14 farmers in Davao del Sur, all of whom were adult rice farmers utilizing various agri-apps using their smartphones. The participants, aged 37 to 57, had farming experience ranging from 3 to 39 years. Among the commonly used agri apps were Bihing Palay, e-Damuhan, Leaf Color Computing (LCC), Accuweather, SpidTech, MOET, and Rice Doctor. These applications served distinct purposes, from aiding rice variety selection to identifying pests and diseases.

Conclusion:

Four overarching themes emerged from the interviews: motivation to adopt agri-app technology, the impact of agri-apps on rice farmers, challenges faced in using agri-apps, and sustained adoption of these applications. Farmers expressed increased efficiency and income due to accurate guidance, particularly after formal training on agri-app usage. Challenges included digital literacy and slow internet connectivity. Farmers exhibited a commitment to sustained agri-app adoption, emphasizing the need for ongoing government support, advanced agri-app education, and knowledge-sharing initiatives within farming communities.

Recommendations:

Based on the research findings and conclusions, several recommendations can be made to enhance the support systems and digital literacy of the rice farmers in Davao del Sur.

To the Department of Agriculture, the researchers recommend that they include continuous training and support, initiatives for advanced agri-apps, community engagement, research and development, and infrastructure improvements to address connectivity challenges.

The government could develop more mobile applications to assist farmers in improving their work and lowering their smartphone expenses. Because the majority of the participants are seekers of knowledge and digital literacy, the government should conduct more training on how to use smartphones in farming and how to improve the rice farming sector.

This study also suggests that smartphone providers reduce the price of their phones so that farmers, not just in Bansalan, Davao del Sur, but in other agricultural areas around the Philippines, may afford a nice and affordable mobile phone that they can use for their farming needs.

Furthermore, other mobile network operators should lower their service prices so that farmers can access them at a lower cost.

Future researchers should use a mix of methods to further comprehend how farmers adopt and use mobile phones. They might compare the survey results to their interview results and further evaluate them. They should think about more than just the growers of rice. They should broaden the perceived utility and simplicity of the use of smartphones, as well as the respondents' opinions toward how they use mobile phones, understand the number of hours farmers spend using mobile phones, and determine the association of each component. They can also develop a model that would aid in understanding the adoption and utilization of smartphones among farmers.

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